

# PROJECT FACT SHEET

**CONTRACT TITLE:** Application of Advanced Reservoir Characterization, Simulation and Production Optimization Strategies to Maximize Recovery in Slope and Basin Clastic Reservoirs, West Texas (Delaware Basin) -- Class III

**ID NUMBER:** DE-FC22-95BC14936

**B&R CODE:** AC1010000

**CONTRACTOR:** Bureau of Economic Geology  
University of Texas at Austin

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**DOE PROJECT MANAGER:**

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**PROJECT SITE**  
**CITY:** Austin **STATE:** TX  
**CITY:** East Ford Field **STATE:** TX  
**CITY:** Geraldine Ford Field **STATE:** TX

**CONTRACT PROJECT MANAGER:**

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**CONTRACT PERFORMANCE PERIOD:**  
3/31/1995 to 3/31/2001

**PROGRAM:** Reservoir Life Extension  
**RESEARCH AREA:** Seismic/Class 3  
**PRODUCT LINE:** ADIS

**CO-PARTICIPANTS:**

**PERFORMER:** Orla Petco  
**PERFORMER:** Conoco, Inc.  
**PERFORMER:**  
**PERFORMER:**

**CITY:** Midland **STATE:** TX **CD:**  
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FUNDING (1000'S)	DOE	CONTRACTOR	TOTAL
PRIOR FISCAL YRS	1589	1590	3179
FY 2002 CURRENT OBLIGATIONS	0	0	0
FUTURE FUNDS	0	0	0
TOTAL EST'D FUNDS	1589	1590	3179

**OBJECTIVE:** Demonstrate that detailed reservoir characterization is a cost-effective way to recover a higher percentage of the original oil in place through strategic placement of infill wells and geologically based field development.

**PROJECT DESCRIPTION:**

**Background:** Slope and basin clastic reservoirs in the sandstones of the Delaware Mountain Group in the Delaware Basin (the western subbasin of the Permian Basin) of West Texas and New Mexico contained more than 1.8 billion bbl of original oil at discovery. Recovery efficiencies of these reservoirs have been considerably lower than that of the national average. Thus, a substantial amount of the original oil in place still remains in these reservoirs. The immediate target for this project is 15.6 million bbl of remaining oil in place in the East Ford field. Through technology transfer, the knowledge gained in the study of this field can then be applied to increase production from more than 100 other Delaware Play reservoirs, which together contain 1.6 billion bbl of remaining oil. In addition, the development and transfer of advanced reservoir characterization techniques provide an opportunity for increasing oil recovery from two other major slope and basin clastic plays in the Permian Basin. The volume of oil to which these techniques can be extended exceeds 10 billion bbl of mobile and residual oil.

**Work to be Performed:** This project will conduct a study to demonstrate that reservoir characterization can optimize infill drilling and CO2 flooding in Class 3 reservoirs. The objectives of Phase 1 of the project were to (1) provide a detailed understanding of the architecture and heterogeneity of two representative fields of the Delaware Mountain Group, Geraldine Ford and Ford West, (2) choose a demonstration area in one of the fields, and (3) simulate a CO2 flood in the demonstration area. After this phase was completed, the industry partner decided not to proceed to Phase 2, a CO2 flood in the Geraldine Ford demonstration area. Instead, a more extensive field demonstration with a different industry partner is being conducted in the East Ford field, which is located immediately adjacent to the Geraldine Ford field and produces from the same Delaware sandstone channel. Phase 1 of the project was expanded to include reservoir characterization of East Ford field. This task provided an excellent opportunity to test the transferability of the geologic model and log-interpretation methods developed during reservoir characterization of the Geraldine Ford field to another Delaware sandstone field. The objectives of the implementation phase of the project remain the same, to (1) apply the knowledge gained from reservoir characterization and simulation studies to increase recovery from a demonstration area, (2) demonstrate that economically significant unrecovered oil can be recovered by a CO2 flood of the demonstration area, and (3) test the accuracy of reservoir characterization and flow simulation as predictive tools in resource preservation of mature fields.

**PROJECT STATUS:**

**Current Work:** Budget Period I was conducted in Ford Geraldine and West Ford fields with Conoco as the operator. An extension of Budget Period I transferred the project to East Ford Field with Orla Petco as the field operator. Budget Period II was completed on schedule, 08/01.

**Scheduled Milestones:**

Complete reservoir characterization of East Ford Field	03/99
Evaluate CO2 flood	06/01
Complete final report	07/01
Project complete	08/01

**Accomplishments:** This project has demonstrated that (1) enhanced oil recovery by CO2 flood can increase production from slope and basin clastic reservoirs of the Delaware Mountain Group, and (2) reservoir characterization can improve EOR projects. CO2 injection in the East Ford unit began in July 1995. As a result of the CO2 flood, production from the East Ford unit has increased from 30 bbl/d at the end of primary production to more than 185 bbl/d in 2001. The unit has produced 180,097 bbl of oil from the start of tertiary recovery through May 2001, and essentially all production can be attributed to the enhanced oil recovery project. Technology Transfer of concepts will benefit development of other Delaware Reservoirs, which contain 1,558 MMBO of remaining oil.

**TECHNOLOGY TRANSFER:**

**Technology/Information Transfer:** Dutton, S. P., and Flanders, W. A., Deposition and diagenesis of turbidite sandstones in East Ford Field, Bell Canyon Formation, Delaware Basin, Texas: talk presented at the 2001 annual meeting of the Southwest Section of the American Association of Petroleum Geologists, Dallas, Texas, March, 2001. Dutton, S. P., and Flanders, W. A., 2001, Field development of a Permian deep-water sandstone, East Texas field, Bell Canyon Formation, Delaware Basin, Texas: talk presented at the 2001 Annual Meeting of the American Association of Petroleum Geologists, Denver, Colorado, June, 2001. Public Relations: A paper summarizing the results of this project won the A. I. Levorsen award for the best paper presented at the Southwest Section AAPG meeting, Midland, Texas, February 28-29, 2000. Website: <http://www.utexas.edu/research/beg/delaware> project.

Dutton, S. P. , 2001, Reservoir characterization of a Permian deep-water sandstone, East Ford field, Bell Canyon Formation, Delaware Basin, Texas: talk presented at the November meeting of the South Texas Geological Society.

Dutton, S. P., and Flanders, W. A., in press, Application of Advanced Reservoir Characterization, Simulation, and Production Optimization Strategies to Maximize Recovery in Slope and Basin Clastic Reservoirs, West Texas (Delaware Basin):article prepared for the Class Act.

Dutton, S. P. and Barton, M. D. 2001, Diagenesis and Reservoir Quality of Deep-Water Sandstones in the Bell Canyon Formation, Delaware Basin, Texas, presented in a theme session on Recent Advances in Deep-Water Facies Models at the annual meeting of the Geological Society of America, Boston, MA., November 2001.

**Public Relations:**

Updated By: **Dan Ferguson**

Date: **12/11/2001**